Scale matters

Title: Scale matters: Variation in perceptions of shale gas development across national, state, and local levels

Authors:

Darrick Evensen, Cardiff University, School of Psychology[1]
Rich Stedman, Cornell University, Department of Natural Resources

1 Corresponding author: Darrick Evensen, Cardiff University, Tower Building, 70 Park Place, Cardiff, CF10 3AT, Wales, United Kingdom; evensend@cardiff.ac.uk

Abstract:

Recent research has shown that an individual's or community's distance from palpable effects of climate change can influence the ways in which residents represent climate change. Research has further established the importance of local/regional context for emergent representations of climate change. We extend this research to the context of energy development and explore the extent to which public representations of shale gas development vary across survey samples at the national (USA), state (NY and PA), and regional levels (ten counties in the Marcellus Shale). We compare results from a survey of Marcellus Shale region residents (n=1202) to those from an identical survey of a US sample (n=1625), with an oversampling of residents from NY and PA (n=516). We find that whilst representations of shale gas development show marked contrast between the local and national level samples, the state level sample compares quite closely with the national level. Respondents' beliefs about which impacts are associated with development explain much more of the variance in support for / opposition to development in the Marcellus sample than in the NY/PA and USA samples. The beliefs about development that associate most closely with support/opposition vary across scale as well. Nevertheless, a few core values are important for predicting support / opposition across all samples. These results suggest a threshold effect in that local representations of shale gas development do not seem to extend far beyond the counties immediately affected by development. We consider implications for communication and social science research on energy development broadly.

1. Introduction:

The relationship between proximity to energy development and support for / opposition to such development is complicated. And necessarily so. It seems intuitive that different types of development (e.g., different energy sources, different means of extraction or generation) or different effects of development might align with varied values and experiences (present and past), thus fostering a range of reactions across individuals within a community and across communities. Prima facie, it would lack all nuance to claim that proximity to development increases or decreases support for development. Indeed, Jacquet [1-2] showed, in a study of residents near wind farm and natural gas development, that proximity to development had little correlation with support / opposition in respect to either energy source. Nevertheless, whilst overall support / opposition may not vary systematically with distance from development, the ways in which people represent development is almost certainly associated with proximity.

Construal level theory maintains that people only concretely experience the local and current, whilst they form 'abstract mental construals' of spatially, temporally, and socially distal objects and events [3, p. 440]. The variation in psychological distance between local, present, and socially-relatable effects / experiences of climate change versus global, future, and/or socially-foreign effects of climate change has received much attention as one potential explanation for how people think about and form positions on the issue of climate change [4-8]. Whilst the causes and effects of climate change differ markedly from the processes and effects associated with shale gas development (hereafter 'SGD'), important commonalities exist. SGD and climate change both have near-term and long-term effects that can be experienced locally, regionally, and globally. There is high uncertainty associated with the magnitude of potential effects in both cases. Furthermore, the effects of both can vary widely based on physical geography and social preparation to mitigate such impacts.

The similarities between SGD and climate change in terms of their effects, not withstanding their differences, led us to infer that construal level theory might also apply to SGD. Whilst individual-level factors are certainly relevant to views about climate change or energy development, radical individual-level determinism seems misplaced [9]. van der Linden demonstrates [10] that a mix of individual and social-level factors are the primary indicators of perspectives on climates change – including norms, feelings of affect, and biospheric values. Therefore, to develop a comprehensive base of theory from which to conceptualise the ways in which proximity to development could affect attendant representations, we complement construal level theory with social representations theory.

Social representations are complex ideas, processes, and objects translated into common sense that is accessible and applicable in everyday life [11-12]. The fact that social actors create and mould social representations is essential; as noted by Billig [13, p. 42]: 'It is a central theme of the social representationists that psychological states are socially produced'. Wagner and Hayes [12, p. 310] highlight the relative import of social (as opposed to individual) processes in fostering social representations when they assert that these representations emerge via 'the translation of sociostructural and cultural conditions into individual dispositions'. The types, content, and frequency of public discourse and communication on a topic powerfully influence the structure of the social representations that emerge from the production process [14].

Historical, cultural, and social processes contribute to the generation of social representations via anchoring [11-12, 15]. Anchoring occurs when a community is exposed to a novel concept, process, or object (e.g., SGD). Through public discourse, the item is linked (anchored) to other concepts, processes, or objects already well understood in the community, which the community considers to be similar or related to the novel item.

In the research herein, we do not test independently for individual-level and societal-level influences on views about SGD, but we do ask survey respondents questions whose answers are dependent on a range of individual and social-level influences, including questions about beliefs about impacts associated with SGD, values relevant to energy development, personal attributes, and attitudes about SGD. We seek to understand less how support/opposition varies with spatial distance from development and more about how beliefs and values associated with SGD covary differently with summary attitudes about development at different geographic scales. We hypothesise that the closer respondents live to SGD, the greater the strength of the relationship between beliefs / values and attitudes. Construal level theory predicts that locally-grounded experiences will be more concrete and specific, thus potentially increasing their ability to explain variance in support for or opposition to SGD. Social representations theory predicts that shared historical and cultural experiences will foster communal discourse about these events that leads to shared interpretations of events, again with more concrete and specific attributes – potentially increasing the relationship between beliefs / values and attitudes about SGD.

2. Methods:

To compare representations of SGD across spatial scales, we conducted two surveys, one of residents in the Marcellus Shale region of southern New York State and northern Pennsylvania and one of a national US sample, with an over-sampling of NY and PA residents to allow for a third, state-level, comparison group.

2.1. Marcellus Shale region survey

We mailed the first survey to a stratified random sample of residents in 34 municipalities in the Marcellus Shale region of southern New York and northern

Pennsylvania (17 municipalities in each state, total N=1202). With an output of 12.5 billion cubic feet of natural gas per day as of November 2013, the Marcellus Shale is the largest natural gas producing region in the USA [16]. Ninety-two percent of gas reserves in the basin are estimated to lie under Pennsylvania and New York [17]. To design the questions for this survey, we conducted a content analysis of regional newspaper coverage in the Marcellus Shale region and 47 interviews with individuals heavily involved in discourse on shale gas development. Particularly, we sought to identify beliefs about impacts, values, and personal attributes that might be associated with attitudes about support for / opposition to SGD. We mailed the survey to a random sample of 147 households in each of the 34 selected municipalities. We selected study communities for the survey by expanding the regions surrounding the six communities used for interviews. The sample included a range of urban and rural areas within each of the six regions and across regions. We included communities that varied on a range of variables that could affect views on SGD (e.g., passage of legislation on SGD, number of wells drilled, amount of land leased, demographic statistics, political leaning).

In July 2013, we obtained a random sample of names, addresses, and telephone numbers for residents in the selected municipalities. The sample was compiled by cross-referencing the most recently available US Postal Service records with telephone book white pages. We excluded seasonal addresses, addresses that had been vacant for over 90 days, and 'drops' (single delivery points that service multiple residences) from the sample. We included all other address types (i.e., regular street addresses, PO Boxes, street addresses that actually go to PO Boxes, rural routes, and deliveries contracted out to third parties by the USPS). We mailed surveys in a four-wave mailing (i.e., survey, reminder, second survey, second reminder). The first wave was mailed in late September 2013; the last wave in mid-October. We closed data collection in mid-November.

The survey was mailed to 4,998 households; 629 of those surveys were returned as undeliverable (345 in NY and 284 in PA). Therefore, with 1202 respondents (637 from NY and 565 from PA), the adjusted response rate for the entire sample was 28%. The rate for the NY municipalities was 30%; the rate for the PA municipalities was 26%. We conducted a non-respondent follow-up, after closure of data collection, to compare respondents and non-respondents for differences on key variables. The non-respondent follow-up sample included 75 completed interviews each from residents in NY and residents in PA. We incorporated a sub-set of the questions from the original survey in this follow-up survey. Both the sample and the non-respondent follow up varied from population means in terms of age, sex, and education. The sample was more educated, more male, and older than the general population. Therefore, we used 2010 US Census data for the six counties in NY (averaged across these counties) and four counties in PA (again, averaged) to generate proportional weights which we applied to the data set for all analyses below.

2.2. National (USA) sample survey, with NY/PA oversample

The second survey was a nationwide Internet survey administered via the online survey firm Qualtrics (N=1625). The sample was split evenly on sex and all respondents were at least 18 years of age; the geographic distribution of respondents was consistent with distribution of the US population, save that we intentionally over-sampled from New York (NY) and Pennsylvania (PA). For data analysis of the US sample, we weight the respondents from NY and PA to represent the proportion of residents from those states within the US. For analysis of the NY/PA sub-sample, we use the unweighted values for these 516 respondents (262 from NY and 254 from PA). The NY/PA sample and the Marcellus sample differ in that the counties included in the Marcellus sample are rather sparsely populated and are, thus,

poorly represented in the NY/PA sample. The majority of respondents in the NY/PA sample come from more densely populated areas of the two states.

Data was collected from 16-19 September 2014. To ensure that data quality was maintained in the US online survey, Qualtrics only included in the final data set respondents who spent at least eight minutes responding to the survey. A pre-test established that this was a reasonable threshold to exclude respondents who were likely engaging in strong satisficing. Fifty-seven people exited the survey prematurely; this equates to an adjusted completion rate of 97%.

2.3. Survey questions

Each survey included several identical questions. Herein, we report three (sets of) questions from each survey. One question measured attitudes about shale gas development by asking respondents, 'Considering everything, do you support or oppose shale gas development in the USA?' (evaluated on a 6-point Likert-type scale, strongly oppose to strongly support). The second question asked, 'How likely do you think the following effects of shale gas development are (in areas with development)?' (response options: not at all likely, not very likely, likely, very likely). Table 1 lists the thirteen potential impacts of SGD included on both surveys. The third set of questions asked respondents about values and personal characteristics that might be associated with views about SGD. The full text of those question is in Table 3.

3. Results

Our first comparison across the three samples examined differences in mean perceived likelihood of the thirteen impacts potentially associated with SGD (Table 1). An ANOVA test with post-hoc pairwise comparisons revealed significant differences between

the Marcellus Shale and US samples on mean perceived likelihood for twelve of the thirteen impacts (seven were perceived as more likely in the Marcellus sample; five were more likely in the US sample). The ANOVA test demonstrated that mean perceived likelihood differed significantly between the Marcellus and NY/PA samples for ten impacts (six were perceived as more likely in the Marcellus sample; four were more likely in the US sample). Nevertheless, none of the mean perceived likelihoods differed significantly between the NY/PA and US samples.

We also reviewed the Pearson bivariate correlations between each impact's perceived likelihood and support for / opposition to SGD in the USA (Table 1). In line with our hypothesis, twelve of the thirteen impacts had higher correlations with support/opposition in the proximate (Marcellus) sample than in either of the distal samples (NY/PA and US). The only exception to higher correlations in the Marcellus sample was that the correlation between short-term local economic impacts was higher in the NY/PA sample than in the Marcellus sample. Whilst many of the impacts are locally-rooted, this impact could conceivably affect broader areas of NY and PA beyond the region of development itself. The comparisons of perceived likelihood of impacts in summary suggest that representations of impacts differ between the proximate and distal samples and that support/opposition is more tied to beliefs about impacts at the proximate scale.

Our second comparison across the samples was between three linear regressions, one for each sample, in which support/opposition was the dependent variable and the independent predictor variables were the beliefs about the thirteen impacts potentially associated with SGD (Table 2). Again, in support of our hypothesis about concrete experience of SGD (as opposed to abstract, higher level construal thoughts about it) being associated more closely with support/opposition, the full set of beliefs about likelihood of impacts occurring explained 68% of the variation in support/opposition for the Marcellus sample, whereas it

explained only 48% and 43% in the US and NY/PA samples. More similarities existed between the US and NY/PA samples in which variables were significant in the regression than between the Marcellus sample and either of the other two. Furthermore, the three statistically significant variables with the largest (absolute) beta values were the same for the NY/PA and US samples (i.e., local long-term economic growth, decreased fish and wildlife health, and increased jobs for locals), whilst only one of these variables was amongst the three largest (absolute) beta values in the Marcellus sample (Table 2). That the variables most strongly associated with support/opposition differ between the sample proximate to development and the two samples distal from development suggests that the causes and/or effects of SGD are being represented differently across these areas.

Our third comparison moved beyond the beliefs about impacts and used a set of values and personal characteristics as predictors of support/opposition in another set of linear regressions (Table 3). Once again, the ability of these variables to explain variation in support/opposition across the sample was much higher in the Marcellus sample (41%) compared to the US (19%) and NY/PA samples (10%). Nevertheless, unlike the previous set of regressions, strong similarities were manifest across the samples in the relative strength of the standardised beta coefficients in the regressions and in which values/characteristics were significant predictors of support/opposition. Two core values, related to the importance of protecting the balance of nature and the importance of private property rights, were the lead predictors of support/opposition in all three models. Age and education were weak and non-significant predictors in each model. Relevant to our interest in the role of proximity to development, whether one currently has an oil or gas lease on his/her property was strongly associated with support/opposition in each regression, but the strength of the standardised beta coefficient declined across the samples as distance from development increased.

4. Discussion

The correlations in Table 1 and the amount of variance explained in the regressions in Tables 2 and 3 all reveal that beliefs about impacts and broad values have a stronger relationship with support for / opposition to SGD in areas proximate to development compared to those more distal from development. This seems consistent with the predictions of construal level theory and social representations theory. In the areas where SGD is experienced more concretely – via exposure to the processes of development themselves and/or intense conversation about the potential for development locally and attendant risks and benefits – lower levels of construal can be used to represent SGD and its effects.

Because psychological distance (spatial, temporal, and social) from SGD is less in areas close to development, people are able to relate the effects of development more directly to their quotidian experience as opposed to needing to relate effects of development to higher level construals, such as broad goals and values that could be affected by development (which would be more likely in areas distal from development) [18]. Trope and Liberman contend [3, p. 441], 'the process of abstraction [at higher levels of construal] involves not only a loss of specific, idiosyncratic, and incidental information, but also ascription of new meaning deduced from stored knowledge and organized in structured representations.' We contend this abstraction contributes to the variation in representations between our three samples. An alternative, but functionally similar, explanation from social representations theory is that communities close to development experience increased levels of discourse about SGD and thus shared meanings related to SGD are negotiated and formed in the public sphere. These shared meanings allow for anchoring that makes the relationship between beliefs about impacts of SGD and values associated with SGD stronger in areas proximate to development.

An important finding of this research is its initial indication of a spatial threshold for a shift in psychological distance and/or societal discourse that fosters shared meanings. By this threshold, we mean the distance from SGD at which representations seem to change. The similarities between representations at the NY/PA and US levels, coupled with the divergence of representations at both of these levels from those in the Marcellus sample, suggests low level construals and concrete anchors emergent from communal discourse are limited to the area immediately surrounding development and do not extend to the broader state – which is still the context in which much policy is enacted on this topic. Whilst the data strongly support this conclusion, an important limitation to consider in this research is the potential for a method effect due to the NY/PA and US samples both being online surveys when the Marcellus sample survey was mailed via post. Because of the rural and sparsely populated nature of the municipalities in the Marcellus Shale region from which we sampled (e.g., Internet use is relatively low and overall population is limited), an online survey would not have been possible in this region. We used an online survey at the national level due primarily to concerns over financial resources and response rates. Further research could verify whether the relationships manifest herein are robust across various methods for eliciting responses.

5. Implications

SGD is often characterised as a highly polarised issue. In our interviews in regions dealing with extant SGD or potential for imminent SGD we have seen this first-hand. Nevertheless, for individuals seeking to introduce nuance into the conversation about SGD, the findings in this research give some cause for hope. That a few key beliefs about impacts correlate so strongly with support/opposition in the Marcellus sample is indeed indicative of polarisation; yet, the lower correlations and lower percentage of variance in

support/opposition explained by these variables in the NY/PA and US samples – potentially indicative of higher level construal – reveal that at the distal scales, additional factors are needed to explain the majority of why people support or oppose SGD. To the extent that one seeks to influence discourse on this issue, it seems that targeting audiences who are more removed from the immediate experience of development might be most effective.

Another communication implication arises from the finding that some key correlates of support/opposition are consistent across all three levels. Table 3 reveals a few values and experiences that associate strongly with support/opposition. Table 2 highlights the strength and significance of the association between long-term local economic growth and support/opposition. Messaging about SGD that focuses on how it does or does not disturb the balance of nature, how regulation of it does or does not challenge private property rights, and how it does or does not foster *long-term* economic growth could be influential in shaping attitudes on development across spatial scales.

When considering the implications of this research from contexts beyond the US, one might benefit from focusing on the similarities across the three samples. Whilst, for example, many differences exist between SGD in Europe and the US (e.g., private vs. national ownership of mineral rights, processes for leasing mineral rights, national vs. state/regional/local governance, the level at which most political discourse occurs, and the length and depth of experience with physical development in the landscape), many differences also exist in these attributes *between* states in the US. Similarities in representations across our survey samples (e.g., the import of several values in Table 3 for predicting support/opposition) suggest relationships that might also be reflected in geographic and social contexts outside the US.

In terms of this research's implications for regulation of SGD, it illustrates for policy makers the potential differences between relevant constituencies. If we assume that a goal of

regulation is to respond to constituent concerns, this research highlights that designing regulation might be complicated by a need to address the interests of a constituency close to areas with (potential for) SGD within a state and a separate constituency in the other regions of the state. The differences in representations manifest between the NY/PA and Marcellus samples reveals that one should not assume beliefs, attitudes, or the factors influencing attitudes are the same in areas proximate to development versus the state at large. We recommend systematic investigation of these two separate constituencies for adequately-informed policy development – particularly because areas exposed to (possible) development are often so sparely populated that these areas would be little more than background noise in state-wide studies of resident perceptions. This implication is potentially transferrable to European nations dealing with prospective SGD as well, perhaps even to a greater degree because SGD is regulated predominantly at the national and international (EU) level in Europe, as opposed to the state level.

Acknowledgements:

Funding for this research was provided via fellowship funding from the US Environmental Protection Agency and via a federal formula funds grant from Cornell University Agricultural Experiment Station.

References:

[1] Jacquet, J. 2012. Landowner attitudes toward natural gas and wind farm development in northern Pennsylvania. *Energy Policy, 50*: 677-688.

[2] Jacquet, J. and R. Stedman. 2013. Perceived impacts from wind farm and natural gas development in northern Pennsylvania. *Rural Sociology, 78*: 450-472.

[3] Trope, Y. and N. Liberman. 2010. Construal-level theory of psychological distance. *Psychological Review, 117*: 440-463.

[4] Spence A., W. Poortinga and N. Pidgeon. 2012. The psychological distance of climate change. *Risk Analysis, 32*: 957-972.

[5] Spence, A. and N. Pidgeon. 2010. Framing and communicating climate change: The effects of distance and outcome frame manipulations. *Global Environmental Change, 20*: 656-667.

[6] Brügger, A., S. Dessai, P. Devine-Wright, T. Morton, and N. Pidgeon. 2015. Psychological responses to the proximity of climate change. *Nature Climate Change, 5*: 1031-1037.

[7] Hart, P., R. Stedman and K. McComas. 2015. How the physical proximity of climate mitigation projects influences the relationship between affect and public support. *Journal of Environmental Psychology, 43*: 196-202.

[8] McDonald, R., H. Chai and B. Newell. 2015. Personal experience and the 'psychological distance' of climate change: An integrative review. *Journal of Environmental Psychology, 44*: 109-118.

[9] Cook, K. 1991. The Microfoundations of social structure: An exchange perspective. In J. Huber (ed.), *Macro-Micro Linkages in Sociology*. London: Sage Publications. pp. 29-45.

[10] van der Linden, S. 2015. The social-psychological determinants of climate change risk perceptions: Towards a comprehensive model.

[11] Moscovici, S. 2001. *Social Representations: Explorations in Social Psychology*. Edited by G. Duveen. New York: New York University Press.

[12] Wagner, W. and N. Hayes. 2005. *Everyday Discourse and Common Sense: The Theory of Social Representations*. Houndmills, UK: Palgrave MacMillan.

[13] Billig, M. 1993. Studying the thinking society: Social representations, rhetoric, and attitudes. In G. Breakwell and D. Canter (eds.), *Empirical Approaches to Social Representations*. Oxford: Clarendon Press. pp. 39-62.

[14] Marková, I. 2003. *Dialogicality and Social Representations: The dynamics of the mind*. Cambridge, UK: Cambridge University Press.

[15] Deaux, K. and G. Philogène (eds.). 2001. *Representations of the Social: Bridging theoretical traditions*. Oxford: Blackwell Publishers.

[16] U.S. Energy Information Administration (US EIA). 2013. *Drilling Productivity Report for Key Tight Oil and Shale Gas Regions, November 2013*. Washington, DC: U.S. Department of Energy. Retrieved from: http://www.eia.gov/petroleum/drilling/. Accessed on 30 September 2015.

[17] U.S. Energy Information Administration (US EIA). 2012. *Annual Energy Outlook 2012*. Washington, DC: U.S. Department of Energy. Retrieved from: www.eia.gov/forecasts/aeo. Accessed on 30 September 2015.

[18] Henderson, M., C. Wakslak, K. Fujita and J. Rohrbach. 2011. Construal Level Theory and Spatial Distance. *Social Psychology*, *42*: 165-173.

Table 1: Mean perceived likelihood of impacts associated with SGD

Impact	Marcellus Shale sample		NY/PA sample		US sample	
	Mean	r*	**Mean**	r*	**Mean**	r*
Increased traffic†	**3.56**[a]	-0.11	**2.76**[b]	-0.06	**2.76**[b]	-0.03
Short-term local economic growth†	**3.25**[a]	0.38	**2.95**[b]	0.50	**2.95**[b]	0.22
Decreased peace and quiet†	**3.04**[a]	-0.50	**2.75**[b]	-0.31	**2.75**[b]	-0.33
Changes in community character†	**3.03**[a]	-0.45	**2.81**[b]	-0.17	**2.78**[b]	-0.16
Increased jobs for locals	**2.96**[a]	0.62	**2.99**[a]	0.36	**3.01**[a]	0.47
Decreased water quality†	**2.88**[a]	-0.68	**2.70**[b]	-0.53	**2.66**[b]	-0.50
Decreased fish and wildlife health†	**2.82**[a]	-0.68	**2.71**[a,b]	-0.53	**2.66**[b]	-0.50
Landowner income from leases/royalties on gas†	**2.69**[a]	0.49	**3.03**[b]	0.24	**2.98**[b]	0.28
Increased energy independence†	**2.67**[a]	0.42	**2.91**[b]	0.35	**2.90**[b]	0.37
Decreased air quality†	**2.65**[a]	-0.66	**2.51**[b]	-0.47	**2.52**[b]	-0.41
Long-term local economic growth†	**2.62**[a]	0.72	**2.74**[b]	0.48	**2.72**[b]	0.57
Decreased human / public health†	**2.47**[a]	-0.66	**2.56**[a,b]	-0.44	**2.57**[b]	-0.45
Lowered property values†	**2.43**[a]	-0.61	**2.59**[b]	-0.39	**2.56**[b]	-0.37

* r = the Pearson bivariate correlation between each impact and support/opposition; all correlations in the Marcellus Shale sample were significant at $p < 0.001$; all correlations in the NY/PA sample and US sample were significant at $p < 0.001$, save increased traffic (NS in both).

† ANOVA comparing means of the impact across survey samples is significant at $p < 0.05$.

[a] superscript letters that vary from each other across the same impact denote significant differences ($p < 0.05$) in post-hoc pairwise comparisons (with Bonferroni corrections) from the ANOVA test.

Table 2: Linear regressions of beliefs about impacts against support/opposition

Impact	Marcellus Shale sample		NY/PA sample		US sample	
	Stand. ß coefficient	Sig.	**Stand. ß coefficient**	Sig.	**Stand. ß coefficient**	Sig.
Long-term local economic growth	**0.28**	.000	**0.15**	.001	**0.25**	.000
Lowered property values	**-0.15**	.000	**-0.11**	.021	**-0.09**	.001
Decreased human / public health	**-0.15**	.000	-0.05	.352	**-0.08**	.029
Increased jobs for locals	**0.14**	.000	**0.13**	.010	**0.16**	.000
Decreased water quality	**-0.13**	.010	-0.16	.052	**-0.11**	.041
Increased traffic	**0.10**	.000	0.01	.917	**0.06**	.023
Decreased air quality	**-0.09**	.026	-0.05	.366	0.01	.767
Landowner income from leases/royalties on gas	0.05	.051	0.04	.349	0.04	.162
Increased energy independence	0.04	.062	**0.11**	.019	**0.11**	.000
Changes in community character	-0.04	.209	-0.04	.400	-0.03	.286
Decreased fish and wildlife health	-0.02	.667	**-0.16**	.040	**-0.16**	.002
Short-term local economic growth	0.02	.538	0.08	.056	**0.05**	.050
Decreased peace and quiet	-0.01	.693	-0.02	.737	-0.03	.304

Overall adjusted R^2 values for each sample: Marcellus Shale = 0.68, NY/PA = 0.43, US = 0.48.

Bold parameter estimates are significant at $p < 0.05$

In a test for multicollinearity, the variance inflation factor (VIF) was < 5 for all variables across each sample, save for water quality and fish/wildlife health (both values were between 6 and 7 in the Marcellus sample and between 5 and 6 in the NY/PA and US samples).

Table 3: Linear regressions of values and personal characteristics against support/opposition

Independent variable	**Marcellus Shale sample**		**NY/PA sample**		**US sample**	
	Stand. ß coefficient	Sig.	**Stand. ß coefficient**	Sig.	**Stand. ß coefficient**	Sig.
A first consideration of a good political system is protection of private property rights	**0.20**	.000	**0.20**	.000	**0.19**	.000
The balance of nature is very delicate and easily upset by human activities	**-0.34**	.000	**-0.19**	.000	**-0.29**	.000
Do you currently have a gas or oil lease on your property? (0=no, 1=yes)	**0.23**	.000	**0.14**	.002	**0.11**	.000
In general, how would you describe your political views? (1=very liberal, 7=very conservative)	**0.17**	.000	**0.14**	.003	**0.17**	.000
Sex (0=female, 1=male)	**0.07**	.019	**0.10**	.030	**0.12**	.000
Age (in years)	0.00	.911	-0.01	.814	0.00	.915
Education (0=less than a bachelor's degree, 1=at least a bachelor's degree)	-0.06	.054	-0.01	.854	0.02	.491

Overall adjusted R^2 values for each sample: Marcellus Shale = 0.41, NY/PA = 0.10, US = 0.19.

Bold parameter estimates are significant at $p < 0.05$.

In a test for multicollinearity, the variance inflation factor (VIF) was < 1.5 for all variables across all three samples.